

PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTONA NEW *PRIONOCIDARIS* (ECHINODERMATA:  
ECHINOIDEA) FROM THE MIDDLE  
MIOCENE OF FLORIDA

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A large number of cidaroid fragments, including a few isolated interambulacral plates but mostly pieces of radioles, were collected at several U.S. Geological Survey (USGS) localities in the Middle Miocene (Chipola Formation) of Florida by Dr. C. Wythe Cooke. A few radiole fragments from the Middle Miocene of Cuba which appear conspecific with the Florida specimens were found among a large number of cidaroid fragments collected by Dr. Robert H. Palmer and Dr. Pedro J. Bermúdez.

The specimens represent an undescribed species of *Prionocidaris*, a genus previously unreported from the Western Hemisphere except for a suggestion by Mortensen (1928:436) that *Cidaris mitchelli* Emmons from the Eocene of North Carolina may belong to this genus.

The new species is best described from Dr. Cooke's material from Florida. Since a publication on Caribbean fossil cidaroids, in which it is desired to give a specific name for the Cuban specimens, will precede one on the United States cidaroids, the species is described in this preliminary paper.

The Cooke collection, including the type specimens, is deposited in the National Museum of Natural History, Smithsonian Institution (USNM). The Palmer specimens are in collections of the Paleontological Research Institution (PRI), Ithaca, New York, and hopefully the Bermúdez specimens will be deposited there also.

Dr. Cooke, Dr. Bermúdez and the PRI very generously loaned their specimens for the duration of my studies, extending over some years now, of Cretaceous and Tertiary Cidaroida of the Caribbean area and the southern and eastern United States. Support for these studies has come at various times from the Jersey Production Research Company, Tulsa, Oklahoma, the National Science Foundation (G-15902), and the University of Puerto Rico, Mayaguez campus (69-24, 70-28). Dr. David L. Pawson and Dr. Thomas E. Bowman, National Museum of Natural History, Washington, D.C. checked over the manuscript. All this help is gratefully acknowledged.

Order CIDADARIDA Claus, 1880

Family CIDADARIDAE Gray, 1825

Subfamily RHABDOCIDARINAE Lambert, 1900 (Emend. Fell, 1966)

***Prionocidaris cookei*, new species**

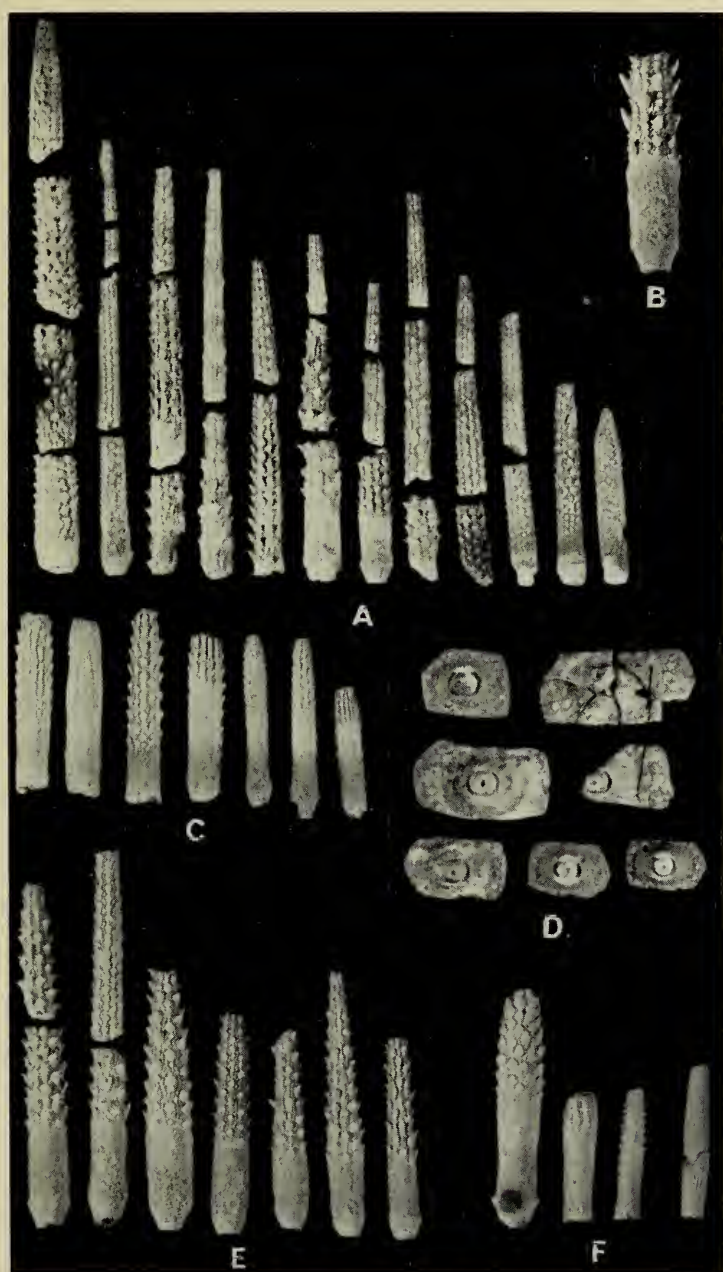
Figures 1-2

*Diagnosis:* Test medium size. Primary areoles more than half width of plate, those near peristome confluent. Scrobicular tubercles round, separated; secondary tubercles otherwise well spaced, of decreasing size to sutures, not horizontally aligned. Radioles moderately long, slender, tapered, sometimes dark-banded, and with regular longitudinal series of uniformly small or small and medium sized spinules. Collar often long, mottled, with low, oval nodules. Oral radioles not "capped."

*Description:* Isolated interambulacral plates (Fig. 1D) are from tests estimated 35-40 mm in horizontal diameter. Areole not depressed, 55-75 percent width of plate; tubercle high with smooth parapet and fairly large and perforate mamelon. Median area 14-22 percent width of plate, 20-38 percent width of areole. Scarcely a full row of scrobicular tubercles at horizontal margins of largest, probably ambital, plates; areoles of adoral plates apparently confluent. Scrobicular tubercles round, separated by space (about equal in width to diameter of scro-

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FIG. 1. *Prionocidaris cookei* n. sp. A, radiole fragments from USGS 2564,  $\times 2$ ; B, holotype, basal fragment of radiole from USGS locality 2564,  $\times 3$ ; C, oral radioles from USGS locality 2564,  $\times 3$ ; D, interambulacral plates from USGS locality 2564,  $\times 2$ ; E, long-collared radioles from USGS locality 3419,  $\times 3$ ; F, oral radioles (3 at left) and secondary spine from USGS locality 3419,  $\times 3$ . All from the Middle Miocene (Chipola Formation), Florida.



bicular areole), this space occupied by small tubercle or ridge. Smaller, widely spaced tubercles outside scrobicular ring decrease in size to sutures. Ten indentations for ambulacral plates on largest plates.

Radiole fragments (Figs. 1-2) mostly from radioles estimated 30-40 mm long but some probably 50 mm long, to 3.5 mm wide, tapered, straight, slightly flattened. Tip acute, narrowly obtuse or sometimes finely coronate. Shaft with 10-14 quite regular longitudinal series of peaked nodules or small spinules often joined into ridges. Spinules on some fragments uniformly small, 0.15-0.4 mm wide, spaced transversely about 0.3-0.6 mm tip to tip, projecting to about 0.4 mm, the smallest in 4-6 series on oral surface of radiole. Other fragments with larger spinules about 1 mm wide and projecting up to about 1-1.5 mm interspersed among smaller spinules on aboral and lateral surfaces, especially prominent in lateral series. Surface of shaft otherwise with minute nodules between and up sides of spinules, apparently remnants of hair coat. Some shafts with traces of dark transverse bands. Junction between shaft and collar sometimes rather oblique or irregular. Collar 2.5-3.8 mm long, about same width throughout or gradually widened toward milled ring; some specimens with faint, dark mottling and low, oval, nodular protuberances between mottling. Milled ring not especially prominent. Base 1-1.5 mm long; acetabular edge smooth on most basal fragments but with what may be faint traces of crenulations on a few.

Oral radioles (Fig. 1C,F) very slightly flattened and curved, with rather inconspicuous, serrate, lateral ridges and several series of smaller serrations on other surfaces, particularly near tip. Tip obtuse or truncate. Collar usually long but not longer than shaft, that is not "capped."

One secondary, apparently ambulacral, spine (Fig. 1F) present with other specimens, 7 mm long, tip and base missing, 1.2 mm wide, slightly flattened, and rather lanceolate in outline.

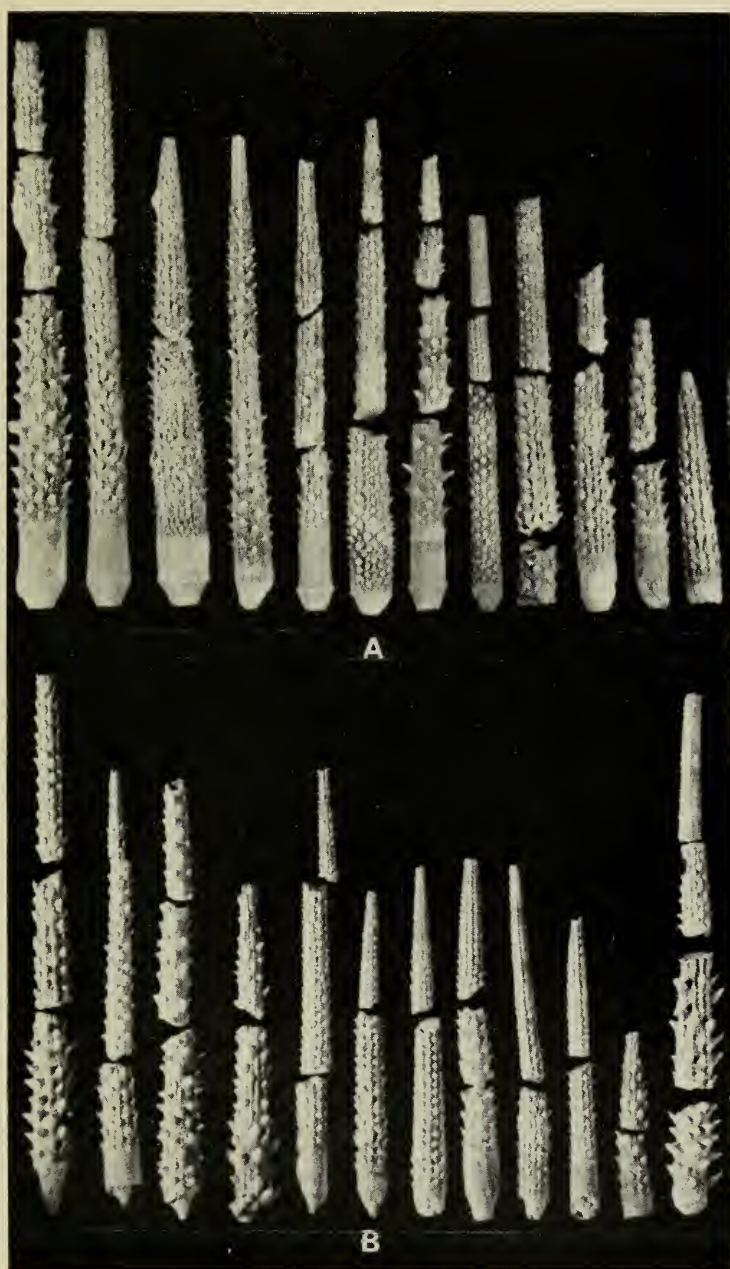
*Measurements of holotype:* Basal fragment of radiole, 10 mm long, 2.2 mm wide, 2 mm thick at base of shaft, 1.7 mm wide and 1.5 mm thick where broken distally. Shaft with 10 series low spinules 0.15-0.3 mm wide and, interspersed among them, larger spinules ca. 0.5 mm wide through base and projecting to 1 mm. Collar 3.8 mm long, 2.2 mm wide distally, 2.1 mm, proximally. Milled ring 2.3 mm wide. Base 1 mm long, 1.9 mm wide distally, 1.4 mm, proximally.

*Etymology:* The species is named for Dr. C. Wythe Cooke who collected most of the known specimens.

*Material examined:* Holotype, USNM 232503, basal fragment of radiole from USGS locality 2564, "Burns' typical locality" in the right bank of Chipola River, on the McClelland Farm one mile below the

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FIG. 2. *Prionocidaris cookei* n. sp. A, radiole fragments from USGS locality 3419,  $\times 2$ ; B, radiole fragments from USGS locality 2213,  $\times 2$ . All from the Middle Miocene (Chipola Formation), Florida.



bridge at the old Bailey Ferry, Calhoun County, Florida, 10 miles west of Blountstown.

*Paratypes:* USNM 232504, 19 interambulacral plates and 32 radiole fragments from USGS locality 2564, as above. USNM 232505, 987 radiole fragments from USGS locality 2213, one mile below Bailey's Ferry on the Chipola River, Calhoun County, Florida, collected from the banks of the river above white limestone beds. USNM 232506, 2 interambulacral plates and 374 radiole fragments from USGS locality 3419, McClelland's Farm on west bank of Chipola River one mile below Bailey's Ferry and new bridge.

All above specimens collected by C. W. Cooke.

A number of radiole fragments which probably are conspecific with those of *P. cookei* were collected by Drs. Robert H. Palmer and Pedro J. Bermúdez at several localities in Cuba: 3 fragments, Palmer 378, N.W. end of Yumurí Gorge series, on N. side, lowest, Matanzas Province; 40 fragments, Palmer 1034, Central Highway cut, both sides, km 425.5 E. of Habana or km 36.1 W. of Ciego, marly limestone, Camagüey Province; 2 fragments, Bermúdez 48, Tejar el Abra, Abra de Yumurí, Cojimar Formation, Matanzas Province; 3 fragments, Bermúdez 83, Tejar Zayas, Matanzas, Cojimar Formation, Matanzas Province; 46 fragments, Bermúdez 147, 1 km S. of Turbina, Central Constancia, Santa Clara Province. The Palmer specimens are in collections of the Paleontological Research Institution, Ithaca, New York, and permission is being sought to deposit there also the Bermúdez material.

*Stratigraphic occurrence and localities:* Middle Miocene (Chipola Formation), Florida; probably also Middle Miocene, Cuba.

*Remarks:* Although described and otherwise previously recorded in other genera, there are three other species of *Prionocidaris* known from the Caribbean Miocene: *Prionocidaris spinidentatus* (Palmer in Sánchez Roig, 1949), *Prionocidaris cojimarensis* (Lambert and Sánchez Roig in Sánchez Roig, 1926), and *Prionocidaris clevei* (Cotteau, 1875). Interambulacral plates of *P. cookei* differ from those of the other three species in having generally a narrower median area in relation to plate width. *P. spinidentatus* was a much larger species than *P. cookei* with much more massive and grossly spinulose radioles. Test size of *P. cojimarensis* was probably near that of *P. cookei*, but radioles of the former species reached greater maximum width and had spinules commonly in distinct whorls while spinules of *P. cookei* apparently almost never were so arranged. *P. clevei* was a smaller species than any of the others with radioles, to be described for the first time in a later publication, even more tightly whorled than those of *P. cojimarensis*.

As far as is known at present, *P. cookei* was the only *Prionocidaris* in the southern and eastern United States during the Miocene, but there probably were at least two living there in the Eocene, *Cidaris mitchelli* Emmons (1858) and *Cidaris carolinensis* Emmons (1858). Both of these species were referred to *Phyllacanthus mortoni* (Conrad, 1850) by Cooke (1941, 1959) but are distinct. Not only the tests (types) but

radioles associated with some test specimens conspecific with the *mittelli* and *carolinensis* types indicate both species are prionocidarid. Their radioles are quite different from those of *P. cookei*; the tests are larger, and the median areas of the interambulacral plates are wider with respect to plate width.

Rather than other fossil species, *P. cookei* bears most resemblance to *Prionocidaris hawaiiensis* (A. Agassiz & H. L. Clark, 1907) now living in Hawaiian waters. The tests of the two species probably were of similar size, and the tapered, dark-banded radioles with mottled, nodulose collars in *P. cookei* are strikingly like those of the Recent species. However, in *P. hawaiiensis* interambulacral plates apparently are all separated by at least one series of scrobicular tubercles; there are more ambulacral plates (13-14) adjoining interambulacral plates than in plates of comparable size in *P. cookei*; the radioles reach a greater maximum length (91 mm), and the adoral radioles are "capped" (shaft much shorter than collar).

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